Seat for a motor vehicle, and motor vehicle equipped with this seat

The present invention relates to a seat for a vehicle, and a motor vehicle equipped with this seat.

The front seats of motor vehicles are generally provided with the possibility of adjusting the position of the seat relative to the structure of the vehicle and adjusting the angle of a backrest relative to a cushion. To achieve this, the backrest is connected to the cushion by a connection articulated along a transverse axis and the cushion is mounted on the floor of the vehicle by means of slide bars. An adjustable seat for a motor vehicle is known from the document FR 2 801 851.

Such a seat, however, which has to be resistant in the case of violent impact of the motor vehicle with an obstacle, has a frame and hinges accordingly provided which are bulky and heavy. A bulky seat is obtained without, however, obtaining satisfactory rigidity of the seat.

The object of the present invention is a front seat for a motor vehicle allowing the design of a lightweight and slim frame to provide a seat which is space efficient and retains a space in a passenger compartment, whilst improving the rigidity and the resistance of the seat.

The object of the present invention is also a front seat for a motor vehicle allowing the protection of the occupants to be improved in the event of longitudinal or lateral impact sustained by a vehicle or in the event of the vehicle overturning.

Such a front seat for a motor vehicle comprises a backrest frame, lower fixing means for rigidly fixing the backrest frame to a lower structural element of a passenger compartment, and upper fixing means for rigidly fixing an upper part of the backrest frame to an upper structural element of a passenger compartment.

The upper and lower fixings of the backrest frame allow the backrest to be held in place relative to the vehicle structure and thus allow an increase in the rigidity of the seat as a whole. The seat may be provided with a slim and lightweight frame without impairing the rigidity of the seat or its resistance, in particular in the event of impact of the vehicle with an obstacle.

Structural element is understood to be a pillar, a cross-member, a side member, a central beam or a sheet metal roof or floor forming the structure of the vehicle.

Advantageously, the backrest frame and the lower and upper fixing means are suitable for forming means for rigidifying a passenger compartment structure of the vehicle. Thus, the backrest frame connecting a lower structural element to an upper structural element of the vehicle allows the vehicle structure to be reinforced. The rigidity of the vehicle is improved, in particular in torsion. The resistance of the passenger compartment in the event of impact is increased and the protection of the occupants is improved.

In order to maintain an adjustment of the backrest, backrest upholstery may be provided mounted vertically mobile on the backrest frame.

In one embodiment, the backrest frame is fixed directly to a lower structural element by lower fixing means. A

cushion frame may be mounted vertically mobile relative to the backrest frame and/or mobile in rotation along a horizontal axis.

In a further embodiment, a cushion frame is rigidly fixed to the backrest frame, and the lower fixing means rigidly connect the cushion frame to a lower structural element of a passenger compartment, the cushion frame, the backrest frame and the lower and upper fixing means being suitable for forming means for rigidifying a passenger compartment structure of the vehicle. The cushion and backrest frames may be formed integrally.

Advantageously, the lower fixing means comprise a single leg supporting the cushion, said leg able to be rigidly fixed to a lower structural element of the passenger compartment. The single leg allows a space to be created for the feet of passengers located on a row of rear seats.

In one embodiment, the upper fixing means comprise at least one upper arm extending from an upper part of the backrest frame and able to be rigidly fixed on the opposing side to an upper structural element of the passenger compartment.

Advantageously, the seat is provided with at least three fixing points for a seat belt. The rigidity conferred to the seat by the upper and lower fixings allows the backrest to resist the tractive force exerted by the seat belt on the upper part of the backrest when the passenger is projected forward.

The invention also relates to a motor vehicle comprising at least one seat according to an aspect of the invention.

The backrest frame of the seat may be rigidly fixed to lower cross-members, to a lower central beam, to a lower side member, and/or to a lower portion of a pillar of the vehicle structure. Similarly, the upper part of the backrest frame may be rigidly fixed to an upper cross-member, to an upper central beam, to an upper side member and/or to an upper portion of a pillar of the vehicle.

With the backrest frame being fixed, and in particular when the seat is intended for the driver, a control unit may be provided which is mobile along a longitudinal axis relative to the seat in order to allow an adjustment of the driving position.

The present invention and its advantages will be better understood by studying the detailed description of embodiments made by way of nonlimiting example and illustrated by the figures, in which:

- figure 1 shows a schematic view in longitudinal section of the passenger compartment of a motor vehicle provided with a seat according to an aspect of the invention;

- figure 2 shows a partial transverse sectional view along II-II of the passenger compartment of a motor vehicle provided with a seat according to figure 1; and

- figure 3 shows a schematic lateral view of a seat according to an aspect of the invention.

In figure 1, a passenger compartment 1 of a motor vehicle, shown partially, is defined by a floor 2, an instrument panel 3 provided with a steering wheel 4, a front windshield 5 and a roof 6. A front driver seat, denoted by 7 in its entirety, is arranged opposite the

steering wheel 4 and located in front of a row of rear seats (not shown).

The seat 7 comprises a cushion 8 and a backrest 9. A frame of the seat 7 is shown in solid lines, padding or upholstery of the seat 7 being defined by dotted lines.

The frame of the seat 7 comprises a cushion frame 10 extending substantially horizontally and being slightly angled toward the rear and a backrest frame 11 extending substantially vertically and being substantially angled toward the rear. The backrest 11 and cushion 10 frames are fixed to one another in a rigid manner. In this case, the frame is in one piece.

The cushion frame 10 is rigidly fixed to the floor 2 by means of lower fixing means in the form of a central block or central leg 12 and a lower plate 13, the leg 12 having an upper end fixed to a central region of the cushion frame 10 and a lower end rigidly fixed to the lower plate 13, the latter being itself rigidly fixed to the floor 2 of the passenger compartment.

The backrest frame 11 and the cushion frame 10 are connected by a curved connecting portion 14 forming a rigid connection between the backrest frame 11 and the cushion frame 10. The backrest frame 11 is provided at its upper end with a fixing arm 15 extending upward from the upper edge of the support portion 11, the end 16 of the arm 15 opposing the support portion 11 being rigidly fixed to an upper structural element of the vehicle.

As is more visible in figure 2, the upper end of the arm 15 is fixed to an upper side member 17 of the vehicle, i.e. a longitudinal structural element of the vehicle defining an upper edge of the roof 6. The passenger compartment 1 is limited laterally by a

pillar 18 located substantially to the side of the backrest 9 of the seat 7.

Such a pillar 18, referred to as 'central pillar' is generally arranged between a rear door opening and a front door opening formed in the structure of the vehicle. Such a pillar contributes to the rigidity of the structure of the motor vehicle, notwithstanding the openings required to access the front and rear seats.

As appears more clearly in figure 2 where the seat 7 has been shown without padding, the backrest frame 11 comprises two lateral pillars 19, 20, a lower cross-member 21, an intermediate cross-member 22 and an upper cross-member 23. A housing portion 24 is formed at the intersection of the pillar 20 located at the side of the central pillar 18 and the upper cross-member 23 of the frame of the support portion 11. The housing portion 24 has the shape of a frame of substantially square section allowing a seat belt reel, not shown, to be housed and fixed to form an upper fixing point of a seat belt installed on the seat 7 which is also provided with lower fixing means in the form of a first fixing lug 21a provided at the lateral end of the lower cross-member 21, at the side of the central pillar 18, and a second fixing lug 21b provided at the opposing end of the lower cross-member 21 of the backrest frame 11. The first lug 21a is provided for permanently fixing one end of a seat belt, the other lug 21b being provided to fix a mobile fixing device of an intermediate portion of the seat belt. A seat belt extending between the different fixing points is schematized in dash-dotted lines C.

The backrest frame 11 comprises a substantially vertical limb 25 connecting the arm 15 to the frame 24 and an oblique limb 26 connecting the arm 15

substantially at the center of the upper cross-member 23 of the support portion 11.

It is understood that the seat, provided that the frame and the fixings are appropriate, i.e. that they are sufficiently resistant, contributes to the increase in the rigidity of the structure of the vehicle by forming a rigidifying element between a lower structural element and an upper structural element. If the rigidity conferred by the seat to the structure is sufficient, the central pillar may be eliminated which is then replaced by the seat frame. Thus, access to the seats is opened up and facilitated for the passengers.

Naturally, the seat cushion frame, instead of being fixed to a floor 2, may be fixed to lower rigidifying cross-members (not shown) arranged transversely across the floor. An oblique or horizontal leg is also conceivable, connecting one side of the cushion frame to a lower cross-member, to a lower end of the vertical pillar, to a lower central beam or to a lower side member (not shown) to open up even more space under the seat for the feet of the passengers. Similarly, it could be provided that the arm 15 is fixed by its upper end to a different element from a side member, such as an upper central beam, an upper rigidifying cross-member (not shown), an upper end of the pillar 18 or directly to the roof 16.

In figure 3, where the reference numerals for the elements which are similar to those of figures 1 and 2 have been repeated, a seat 7 comprises a backrest 9 comprising a backrest frame 11 provided with an arm 15, rigidly fixed to a side member 17 of an upper part of the structure of a motor vehicle. The backrest frame extends downward by means of a lower extension 27 which is rigidly connected to a floor 2 of the motor vehicle. Backrest upholstery 28 is provided on one side of the

backrest frame 11. This upholstery may be fixed to the cushion frame 11, or may be vertically displaceable, as illustrated by the arrow D.

The seat 7 further comprises a cushion frame 10 comprising an end fixed to the backrest frame 11 below the backrest upholstery 28 and extending substantially perpendicularly to the backrest frame 11. The cushion frame 10 carries cushion upholstery 29 on an upper surface. The cushion frame 10 may be rigidly fixed to the backrest frame 11, for example by being formed integrally therewith, or mounted mobile along a horizontal axis 30 (perpendicular to the plane of figure 3) so as to allow an adjustment of the angle of the cushion or to push the cushion against the backrest, in a movement indicated by the arrow R.

A foldable leg may possibly be provided allowing one free end of the cushion to be supported in the position of use, as shown in dotted lines by the reference numeral 31 and by the arrow P on figure 3.

It may also be provided that the cushion frame 10 is mounted vertically mobile, according to the arrow D, on the backrest frame 11 so as to allow an adjustment of the height of the cushion.

In this embodiment, the backrest frame is fixed directly in a rigid manner to the upper and lower elements of the structure of the vehicle, such that the backrest frame itself may contribute to the reinforcement of the structure of the motor vehicle.

In this case also, the backrest frame of the seat, instead of being fixed to a floor 2, may be fixed to lower rigidifying cross-members (not shown) arranged transversely across the floor. A lower oblique or horizontal extension 27 is also conceivable, connecting

the backrest frame to a lower cross-member, to a lower end of the vertical pillar, to a lower central beam or to a lower side member (not shown), to open up even further the space below the seat for the feet of the passengers. Similarly, it could be provided that the arm 15 is fixed by its upper end to a different element from the side member, such as an upper central beam, an upper rigidifying cross-member (not shown), an upper end of the pillar 18 or directly to the roof 6.

As a result of the invention, a seat is obtained allowing the weight of the frame of a seat to be reduced whilst increasing the rigidity of the seat, in particular in the event of impact. The frame of the lightweight seat allows the habitable space of a passenger compartment of the motor vehicle to be maintained, in particular for the rear passengers. The seat may be used to rigidify the structure of the motor vehicle in its entirety.